



Marshall and TSR  
Compression Machine



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## Introduction

The Humboldt H-1322B, Marshall and TSR Compression Machine, is a state-of-the-art apparatus specifically designed for Marshall and TSR testing. These tests can be used to evaluate the relative quality of materials, as well as generate input for pavement design or pavement evaluation and analysis. The microprocessor-based system incorporates a 16-bit Analog to Digital (A to D) converter with chart recorder output and RS232 computer connection capabilities. The system automatically tests and records Marshall stability and plastic flow of Bituminous mixture on one chart with an accuracy to less than 1 percent over the total range, eliminating operator error in dial readings and manual recording of data.

Meets ASTM D6927, D4123-82; AASHTO T245, T283, BS 598-107.

Overall dimensions are: 36" x 18" x 38-1/2" H (914 x 457 x 978mm).

Shipping wt. 250 lbs. (113.6 kg)

### Features include:

- The Marshall and TSR Compression Machine has a total frame capacity of 10,000 lb (45kN).
- Stress is measured with a supplied S-Type load cell.
- The apparatus features an AC single-speed motor with an operating rate of 2 in/min or (50.8mm/sec.), and a built-in yt chart recorder, for monitoring load vs. rate of compression.
- The 16-bit Analog to Digital converter can be connected directly to a computer or serial printer for live data monitoring.
- The apparatus automatically detects the peak value, automatically stops testing procedure upon completion and automatically activates the chart recorder for a hard copy of the test data.
- Maximum piston travel is 3-1/2" (88mm) with limit switch to prevent gearbox jams and damages.

## General Information

### Inspection

Your Marshall & TSR equipment was thoroughly inspected before it was shipped and should be ready to operate as soon as you have completed the set-up procedure. Notify Humboldt Mfg. Co. or your local agent and file a claim with any carriers involved if you find any damage to the machine. Unpack all of the equipment carefully to prevent loss of small items or manuals.

**Physical Specification**

Net weight:	226 lbs. (110 kg)
Shipping weight:	266 lbs. (113.6 kg)
Overall height:	39"
Base dimension:	35"x18"x10"

**Power Supply**

- 110 VAC 60 Hz 1 phase (H-1322B), 975 watts
- 220 VAC 60 Hz 1 phase (H-1322B.2F), 975 watts
- 220 V AC 50 Hz 1 phase (H-1322B.5F), 975 watts

Check that your machine has the correct voltage for your local supply.

**Power Cord**

Your Marshall & TSR Test Machine is fitted with a fused IEC receptacle and cord with molded vinyl-grounding plug. The cord is made of three conductors:

**(American color-coding)**

Green	Ground (Earth)
White	Cold (Neutral)
Black	Hot (Live)
or	

**(European color coding)**

Green /Yellow	Ground (Earth)
Blue	Cold (Neutral)
Brown	Hot (Live)

**Fuses**

The Marshall Test Machine uses a slo-blow fuse that is fitted into the rear of the machine. The replacement part a 5 x 20 mm 10A, 250V ceramic (or glass).

**Initial Installation**

Remove the packing list and verify that all parts have been received. Normally you will receive one crate comprised of compression and recorder frame, with calibrated load cell (HM-2300.100) 10,000lbf capacity (44kN) fastened to it, 100 charts (H-1322CP), 6 pens, a DB9 serial cable, and this user manual.

Set the machine base up at the place it is to be used in the laboratory and then check that it is level by placing a spirit level on the platen. If it is not level, adjust the feet of the machine.

**Operation**

**Control Panel**

The control panel is situated on the front right hand side of the machine base. Recorder range and pen controls are on the recorder's chart plate.

**Preset Speed of Platen:**

2.00 in/min. (50.80mm/min.)

**Direction of Travel**

It is necessary to ensure that the direction of the platen (up or down) has been correctly selected. Choosing one of the three switch positions controls the platen travel direction: Up, Off, or Down.

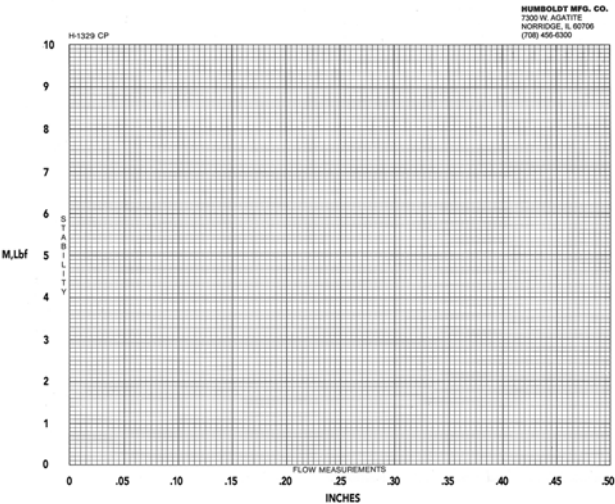
**Note:** There is a 4 second delay built in between a change in motor direction to allow the motor to stop before restarting in the opposite direction.

**Maximum Travel Limit Switches**

Maximum travel limits up and down are indicated on the control panel with green and red indicating lights. The machine will stop operation in that direction and one of the lights will be illuminated. The maximum travel of the platen is 3.50" (88mm).

**Chart Scales**

A sample chart is included with these instructions. The vertical axis major divisions each represent, depending on the range chosen, 500 or 1000 pounds force and the horizontal major divisions each represent .05 inches of flow (or platen travel).



**Maximum Load**

The Marshall & TSR Compression Machine is rated a 10,000 lbf (44kN), which is the load cell range. An automatic, high load cut-off feature stops the machine at approximately 10,500 lbf.

**Flow Measurement**

The pen travel in the horizontal axis (flow) direction indicates the flow on the chart; its speed is exactly correlated with the 2 in./min. platen speed of the compression machine. The full-scale range on the chart is .5 inches of flow.

## Running a Test

1. Turn on the rear power switch, install a pen in the holder by turning about three turns clockwise with light finger pressure only, and place a sheet of chart paper under the holders.
2. Place the lever in the Pen Down position and zero the pen on the chart with the positioning knobs, placing the pen at the origin of the graduated area of the chart. This will ensure complete recording initiated by sensing of the load. Select the load range with the selector switch on the recorder and place a check in the box for that range on the chart.
3. Place the conditioned specimen in the breaking head and onto the machine platen.
4. Push the Up button that has a 4-second delay to begin pen contact, travel and loading after which the test proceeds automatically.
5. Upon reaching the stability load or TSR peak, the machine proceeds until a 5% reduction in load occurs, at which time it stops, waits 4 seconds, then reverses and goes to the lower limit of down travel.
6. Load the next specimen and repeat Step 4.
7. Upon completion of tests move the recorder lever to the "Load" position and remove the chart paper.

**Important** - If a test is incomplete for some reason, reset the processor by turning off the machine power with the rocker switch on the rear panel.

## Calibration

As received, the machine is calibrated to 1% accuracy or better over the full range.

When it is necessary to check calibration proceed as follows:

### CAUTION

**IMPORTANT:** Press the Down travel switch to lower the platen to its lower limit of travel as indicated by the red (Ready) light coming on, then press the red Stop button, which deactivates the automatic test function.

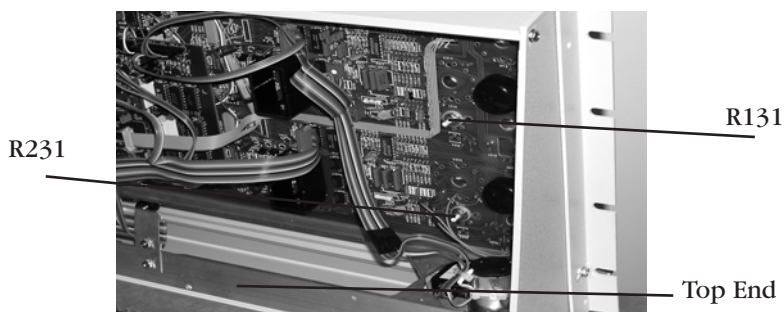
Use a load ring or load cell as a reference gage to check calibration by placing it directly under the machine's load cell (in place of the Marshall or TSR breaking head).

Remove the Crank hole plug (left side of casing).

Using a  $\frac{1}{2}$ " hex socket on a  $\frac{3}{8}$ " drive ratchet, connect to the internal male hex shaft and crank counter clockwise to raise the platen and apply load to the reference gage and the machine's load cell.

Starting from the chart origin, observe the recorder's pen position and check it against the reference gage reading for each 1000 lbf of load applied.

If an adjustment other than a zero shift is needed, remove the recorder from the chassis leaving the cables connected and from the picture below find potentiometer R231 (for the Y axis). With a small, plastic screw driver turn the pot to increase or decrease the gain as required.



Calibration of the Flow or X axis is accomplished by measuring the platen travel with a rule while keeping time with a stop watch (usually  $\frac{1}{2}$ " in 15 seconds is the measured distance and time check) while observing the chart reading. If the travel is not within  $.50" \pm .04"$  on the chart adjust the gain using pot R131.

## Maintenance

The machine and transducers should be kept clean and the machine should not be over lubricated. Light oiling with synthetic instrument oil at most is required on exposed spindles and threads; the jack and gear box are serviced with a premium wheel bearing grease such as Pennzoil 707L Lubriplate Grease applied thru the grease fitting no more than annually, or when an indication of power train friction appears.



# **General Warnings**

## **Safety Warnings**

Operators should take care to operate this machine under the maximum load restrictions. The machine is programmed at the factory to provide safety shutdown if the upper or lower maximum travel is exceeded as well as if the upper instrument calibration is exceeded.

## **Electrical Warnings**

Typically, there is no reason for the operator to open the machine. However, if the customer's engineers attempt to change settings to the circuit board connected to the back panel, the machine must always be unplugged before this operation. Unplugging the internal connection to the back panel circuit board while the machine is under power will result in permanent damage to the circuit board.

# **IMPORTANT NOTICE**

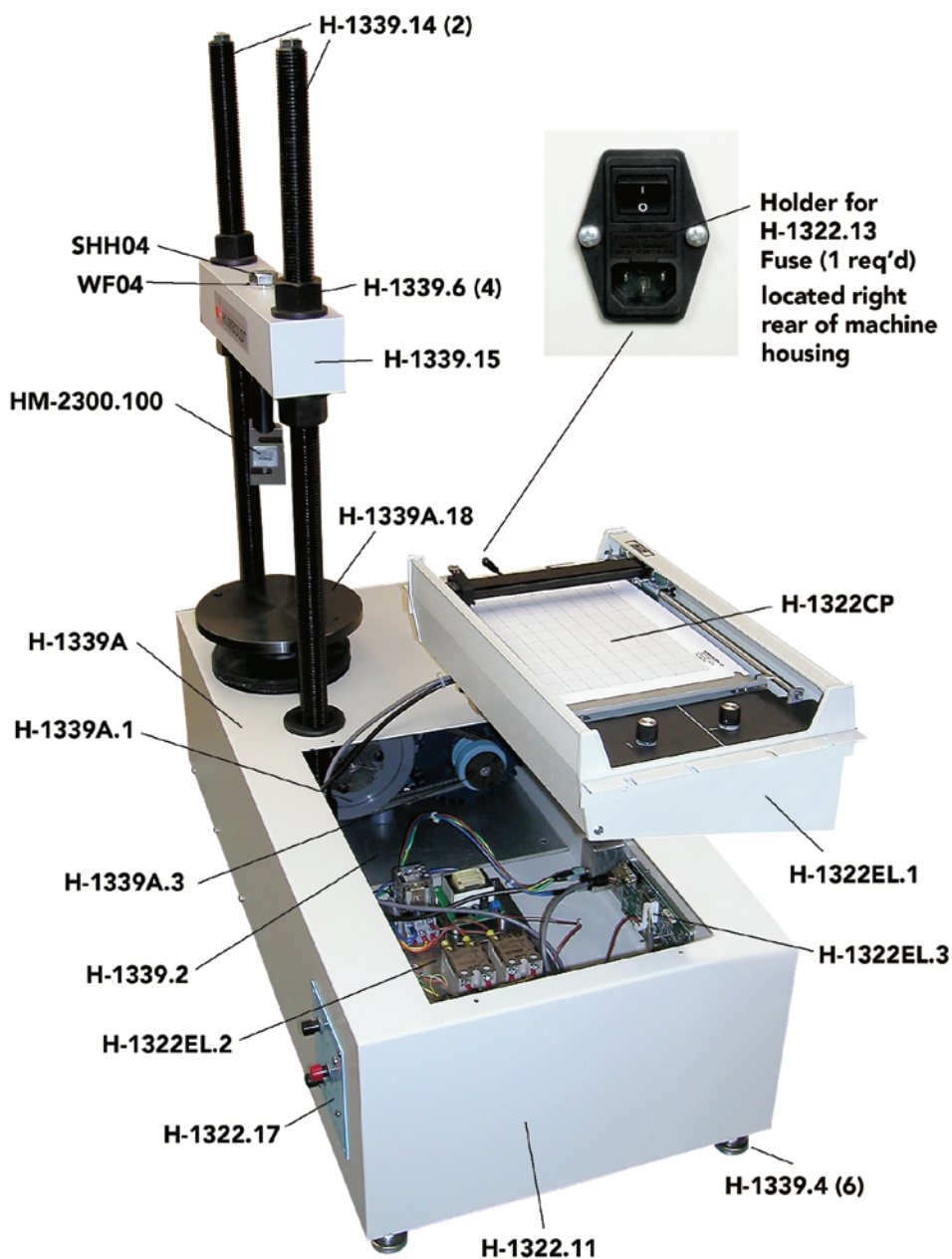
The information contained herein is supplied without representation or warranty of any kind. Humboldt MFG. Co. therefore assumes no responsibility and shall have no liability, consequential or otherwise, of any kind arising from the use of the described equipment contained in this manual.

## **Updated products**

The manufacturer reserves the right to change or modify product design or construction without prior notice and without incurring any obligation to make such changes and modifications on products previously or subsequently sold.

## **Fitness for application**

The manufacturer makes no recommendations or claims regarding fitness for applications other than the specific tests as defined in this User Guide.



## Notes

## Warranty

Humboldt Mfg. Co. warrants its products to be free from defects in material or workmanship. The exclusive remedy for this warranty is Humboldt Mfg. Co., factory replacement of any part or parts of such product, for the warranty of this product please refer to Humboldt Mfg. Co. catalog on Terms and Conditions of Sale. The purchaser is responsible for the transportation charges. Humboldt Mfg. Co. shall not be responsible under this warranty if the goods have been improperly maintained, installed, operated or the goods have been altered or modified so as to adversely affect the operation, use performance or durability or so as to change their intended use. The Humboldt Mfg. Co. liability under the warranty contained in this clause is limited to the repair or replacement of defective goods and making good, defective workmanship.

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